

REMARKS

The Official Action mailed May 16, 2011, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for One Month Extension of Time*, which extends the shortened statutory period for response to September 16, 2011. Also, filed concurrently herewith is a *Request for Continued Examination*. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statements filed on July 6, 2006; August 23, 2010 and December 21, 2010.

A further Information Disclosure Statement was submitted on June 17, 2011. An additional Information Disclosure Statement is submitted herewith. Consideration of these Information Disclosure Statements is respectfully requested.

Claims 29-31, 33, 50-52, 55 and 57-62 were pending in the present application prior to the above amendment. Claims 30, 31, 51, 52, 55 and 57-62 have been canceled without prejudice or disclaimer, claim 29 has been amended to better recite the features of the present invention and new claim 63 has been added to recite additional protection to which the Applicant is entitled. Accordingly, claims 29, 33, 50 and 63 are now pending in the present application, of which claim 29 is independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 5 of the Official Action rejects claims 51 and 57 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 51 and 57 have been canceled herein, without prejudice or disclaimer. Therefore, the rejection of these claims is moot.

Paragraph 9 of the Official Action rejects claims 29, 30, 33, 50, 55, 58, 61 and 62 as obvious based on the combination of U.S. Publication No. 2004/0185300 to Hatwar, Liu (Synthetic Metals 2004, 146, 85-89), and Thomas (Journal of the American Chemical Society, 2001, Volume 123, Pages 9404-9411). The Applicant respectfully

submits that a *prima facie* case of obviousness cannot be maintained against the independent claims of the present application, as amended.

As stated in MPEP §§ 2142-2144.04, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some reason to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims, as amended. Specifically, independent claim 29 has been amended to recite that the claimed carbazole derivative is comprised in a hole injection layer which is in contact with the anode, supported at least by paragraphs [0030] and [0036] of the pre-grant publication. Claim 29 has also been amended to clarify that the hole transporting layer and the electron transporting layer comprise a hole transporting material and an electron transporting material, respectively. Claim 29 has been amended, still further, to recite that in the claimed carbazole derivative, R¹² and R¹⁴ represent hydrogen (i.e., to delete the recitation that R¹² and R¹⁴ represent an alkyl group having 1 to 6 carbon atoms or an aryl group having 6 to 12 carbon atoms) and that Ar¹¹ represents an aryl group having 6 to 12 carbon atoms (i.e., to delete the

recitation that Ar¹¹ represents a heteroaryl group having 5 to 9 carbon atoms). For the reasons provided below, Hatwar, Liu and Thomas, either alone or in combination, do not teach or suggest the above-referenced features of the present invention.

The Official Action asserts that Hatwar teaches that the *light emitting layer* is composed of a host material and a blue dopant and that Liu teaches a carbazole derivative (DECMA) to be used as a blue dopant in Hatwar (pages 4 and 5, Paper No. 20110510). However, it is respectfully submitted that Hatwar, Liu and Thomas, alone or in combination, do not teach or suggest that a carbazole derivative is comprised in a *hole injection layer* of a light-emitting element, as recited in the amended claims. In any event, for the reasons described in detail below, it would not have been obvious to combine Hatwar, Liu and Thomas to obtain the carbazole derivative recited in the claims of the present invention.

The Official Action concedes that Hawter does not teach that a "blue dopant is a carbazole dopant that meets the applicant's claimed guest material." However, the Official Action asserts that:

"Liu teaches a carbazole compound with the following structure, (DECMA, page 86 right column), which reads on applicant's formula (1), where R¹² and R¹⁴ are hydrogen and Ar¹¹ is m-tolyl. Liu teaches that these carbazoles can be used in light emitting elements and can be found in the light emitting layer and emits blue light (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA). Liu teaches that DECMA would be usefully as a blue dopant because it has a good purity because of its narrow full-width at half-maximum (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA)" (Id.).

The Official Action further asserts that:

"Thomas teaches a light emitting element comprising a carbazole compound (abstract). Thomas teaches the carbazole compounds can be used in the light emitting layer and contains light emitting properties (page 9404 right column paragraph at beginning of column). Thomas further teaches that when the N position on a carbazole group is changed from an alkyl group to an aryl group, the emission wavelength of the material is blue shifted (page 9407 Table 1 compounds 9 and 10 and 11 and 12). Thomas teaches that one can blue shift the carbazole material by

changing an ethyl group that is attached to the N position on the carbazole to an aryl group (page 9407 Table 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole compound (DECMA) of Liu so the ethyl groups were changed to phenyl groups. The motivation would have been to blue shift the material. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the blue light emitting layer of Hatwar so the modify compound of Liu was used as the dopant. Hatwar teaches that any blue dopant can be used and Liu teaches that DECMA is a good blue dopant because of it has good color purity; therefore it would have been obvious to one of ordinary skill in the art to use the modify Liu compound as the blue light emitting dopant" (Page 5, Id.).

The Applicant respectfully disagrees and traverses the assertions of the Official Action. Initially, it is noted that Thomas is silent with respect to Liu's DECMA compound. Specifically, Thomas only appears to describe preparation of carbazole compounds, which do not appear to include DECMA, with peripheral arylamines. Thomas teaches a carbazole compound with peripheral carbazole (16). However, this compound does not fall within the scope of amended claim 29. Furthermore, Thomas does not appear to offer any comparative data with respect to DECMA or any improvement thereof in a light emitting element. Therefore, it is respectfully submitted that the Official Action has not sufficiently demonstrated that one of ordinary skill would have had a reasonable expectation of success in improving Liu's DECMA carbazole derivative in view of Thomas.

In any event, the Applicant further submits that the present invention obtains a nonobvious advantage, which has not been recognized in the asserted prior art, in that the claimed hole injection layer including carbazole derivative has a greater hole injecting ability than the DECMA compound of Liu. A Declaration under 37 CFR § 1.132 is submitted as evidence of these unexpected results. Included with this Declaration, Exhibits 1 and 2 show superior voltage/current and voltage/luminance characteristics of the claimed hole injecting layer over a hole injecting layer comprising DECMA. These exhibits demonstrate such advantages in varied devices; for example, Exhibit 1 demonstrates these unexpected results in a device having CzPA:2PCAPA (1:0.05) as

an emission layer and Exhibit 2 demonstrates similar results in a device having Alq:C6 (1:0.01) as an emission layer. Section 6 of the Declaration specifically details the construction of the respective devices.

As evidenced in Exhibits 1 and 2, and as described in sections 7 and 8 of the Declaration, a hole injecting layer including the claimed carbazole derivative achieves significant improvements with respect to its driving voltage requirements. These improvements were unexpected and would not have been obvious to one of ordinary skill in the art at the time of the invention practicing Liu. Furthermore, neither Hatwar, Liu nor Thomas appear to describe results commensurate with those achieved by the present invention. Therefore, the Applicant respectfully submits that emission performance achieved by the present invention is superior and unexpected in view of the prior art. Accordingly, Hatwar, Liu and Thomas, either alone or in combination, do not obviate the features of the present invention.


Since the prior art do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

A new claim 63 has been added to recite additional protection to which the Applicant is entitled. The features of this new claim are supported, for example, by paragraph [0119] of the pre-grant publication of the present application. For the reasons stated above and already of record, the Applicant respectfully submits that new claim 63 is in condition for allowance.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized to charge fees under 37 C.F.R. §§ 1.16, 1.17, 1.20(a), 1.20(b), 1.20(c), and 1.20(d) (except the Issue Fee) which may be required now or hereafter, or credit any overpayment to Deposit Account No. 50-2280.

Respectfully submitted,



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